Prescription Drug Spending: The Impact of Age and Chronic Disease Status

ABSTRACT

Objectives. The purpose of this study was to examine how pharmaceutical expenditures vary by age and the presence of chronic health problems.

Methods. Data from the 1987 National Medical Expenditure Survey were used to obtain nationally representative estimates of outpatient prescription drug expenditures for the noninstitutionalized population and the fraction of total health expenditures used to purchase medications for age-chronic disease population subgroups.

Results. Although the elderly make up 12% of the population, they account for 34% of total pharmaceutical expenditures. Pharmaceutical expenditures are 9% of total expenditures for children, 13% for nonelderly adults, and 23% for the elderly. Among nonelderly adults, approximately one third have at least one chronic condition and account for over two thirds of drug expenditures. Among the elderly, 36% have three or more chronic conditions and account for 57% of drug expenditures for this group; 41% of total drug expenditures are for cardiovascular or renal drugs.

Conclusions. Significant pharmaceutical spending is for treatment of chronic conditions, which subjects insurance coverage to adverse selection and could affect the design of prescription drug benefit packages. Current enrollees in Medicare risk management plans who have drug benefits may face significantly higher out-of-pocket expenses for pharmaceuticals if capitation rates are cut as a means of controlling Medicare program expenditures. (*Am J Public Health.* 1997;87:1626–1629)

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Introduction

Pharmacy benefits management is used as a tool to contain costs under both traditional and managed care plans and as part of disease management programs for persons with chronic conditions. These trends will continue as outpatient care substitutes for inpatient care and as more persons with chronic conditions enroll in managed care plans. Increasingly, firms that provide retiree health benefits are reducing their financial liabilities by shifting costs—including the costs of drugs—to retirees.[1,2] Shifts in the costs of drugs to Medicare risk plan enrollees with drug benefits is expected in the future if Congress limits the growth of capitation rates.

To understand implications of current trends in drug coverage and the impacts of policies that change drug benefits, information on the level of drug expenditures and how expenditures vary across population groups is needed. The purpose of this paper is to examine how pharmaceutical expenditures vary by age and the presence of chronic health problems.

Methods

Our primary source of data was the Household Component of the 1987 National Medical Expenditure Survey (NMES), a health expenditure survey administered to a nationally representative sample of 36 000 persons in 14 000 households.[3,4]

Adult respondents were asked if a doctor had ever told them that they had one or more of the following conditions: heart disease, arteriosclerosis, hypertension, diabetes, cancer, arthritis, emphysema, gall bladder disease, rheumatism, heart attack, or stroke. Although this set of chronic conditions is by no means exhaustive, it includes the diseases that are most prevalent or are the leading causes of death in the United States.[5,6] Additionally, most of these conditions are associated with high costs, and treatment often involves the use of prescription medications. Reported prescription drugs were categorized into therapeutic classes based on the standard drug classifications in the National Drug Code Directory[7] and used in the 1991 National Ambulatory Medical Care Survey Drug File. Therapeutic classes well represented in the NMES data include cardiovascular and renal drugs, gastrointestinal agents, hormone-related drugs and agents, drugs used for pain relief, and respiratory tract drugs.

Expenditure estimates, reported in 1987 dollars, have been weighted to represent the US population and adjusted for underreporting, on the basis of evidence from comparisons of household- and pharmacy-reported pharmaceutical expenditures. The NMES estimate of total outpatient expenditures closely matches estimates from the 1987 National Health Accounts after this adjustment ($24.8 billion; D. R. Waldo, Health Care Financing Administration, written communication, 1994). Standard errors were adjusted for complex survey design effects associated with design of the NMES.

Results

Expenditures by Age

In 1987, adults aged 18 through 64 years accounted for 62% of the population

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TABLE 1—Outpatient Pharmaceutical Expenditures, by Age, 1987

Age Group	% of Population	% of Pharmaceutical Expenditures	Drug Expenditures as % of Total Health Expenditures (SE)	Distribution of per Capita Pharmaceutical Spending			For Those Spending in Upper Decile	
				Median, $	Mean, $ (SE)	90th Centile, $	Mean per Capita Pharmaceutical Spending, $ (SE)	Drug Expenditures as % of Total Health Expenditures (SE)
All ages	100.0	100.0	13.0 (0.2)	13	111 (2.5)	301	765 (18.0)	39.0 (0.5)
Children (0–17 y)	26.6	9.1	9.0 (0.2)	4	38 (7.0)	72	274 (69.5)	26.9 (0.8)
Nonelderly adults (18–64 y)	61.6	56.5	12.8 (0.2)	12	102 (2.4)	268	691 (14.4)	40.1 (0.7)
Elderly (65+ y)	11.8	34.4	22.9 (0.4)	169	324 (8.0)	841	1347 (38.5)	38.7 (1.4)

Note. Sampling weights were used to calculate statistics representative of the US population in 1987. Population estimates for 1987 are as follows: all ages, 239 393; children, 63 749; nonelderly adults, 147 349; elderly, 28 295. Pharmaceutical expenditures are corrected for underreporting and are in 1987 dollars.
Source. 1987 National Medical Expenditure Survey.

and 57% of total prescription pharmaceutical spending (Table 1). Although the elderly made up 12% of the population, they accounted for 34% of total pharmaceutical expenditures. Only 9% of expenditures were attributable to children younger than 18 years. Pharmaceutical expenditures were 9% of total expenditures for children, 13% for nonelderly adults, and 23% for the elderly.

Per capita spending was greatest for the elderly—$324 in 1987 dollars, vs $102 for nonelderly adults and $38 for children. The distribution of expenditures for each age group is very skewed, with a substantial number of persons (particularly in the nonelderly population) having no expenditures while others had very high expenditures.

The last three columns of Table 1 describe spending for those in the top 10% of the expenditure distribution. Mean expenditures for nonelderly adults in this top decile exceeded those for all nonelderly adults by a factor of 6.8. The elderly in the top decile spent $1347 on prescription drugs, compared with $691 for nonelderly adults and $274 for children. Prescription drug expenditures for persons in this top decile accounted for between 27% and 40% of total health care spending.

Expenditures and Chronic Disease

Chronic disease is an important determinant of drug expenditures. Approximately one third of adults aged 18 to 64 had at least one of the conditions listed on the NMES. These persons accounted for more than two thirds of drug expenditures by persons in this age group (Table 2). Among the elderly, 36% had three or more chronic conditions and accounted for 57% of drug expenditures for this age group. Of adults in the top expenditure decile, 79% of the nonelderly and 97% of the elderly reported at least one chronic disease.

Expenditures vary directly with chronic conditions. For the elderly, mean expenditures were $196 for those with one chronic condition and $519 for those with three or more. For nonelderly adults, mean expenditures were $129 for those with one chronic disease and $478 for those with three or more. As a share of total health expenditures, elderly persons with three or more chronic conditions spent 27% on drugs, vs 11% for elderly persons with no chronic conditions. Among nonelderly adults with no chronic conditions, 9% of total health expenditures were for outpatient drugs; by contrast, prescription expenditures accounted for 29% of total expenditures among nonelderly adults with three or more chronic conditions.

Arthritis and hypertension were the most prevalent conditions of NMES respondents. Mean drug expenditures for nonelderly and elderly persons with arthritis were $267 and $396, respectively; expenditures for nonelderly and elderly persons with hypertension were $256 and $437, respectively. Per capita prescription drug spending levels for persons with diabetes, emphysema, and heart disease were substantially higher: for adults with one of these three conditions, spending ranged from $404 to $457 among the nonelderly and from $520 to $557 among the elderly.

Expenditures by Therapeutic Class

In 1987, over 80% of all outpatient pharmaceutical expenditures were for drugs in seven broadly defined therapeutic classes; cardiovascular and renal drugs (31%), drugs used for pain relief (11%), antimicrobial agents (9%), hormone-related drugs and agents (9%), psychotropic drugs (9%), gastrointestinal agents (7%), and respiratory tract drugs (6%).

Fifty-four percent of drug spending for children was for antimicrobial agents and 14% was for respiratory tract drugs. For adults aged 18 through 64, expenditures were concentrated in four therapeutic classes: antimicrobial (21%), cardiovascular and renal (14%), hormone-related (13%), and pain relieving (17%). Among the elderly, 41% of total drug expenditures were for cardiovascular and renal drugs.

Spending on cardiovascular and renal drugs by the elderly can be explained by the fact that more than 60% of the elderly reported having either a heart condition or hypertension. For the 20% of the elderly who reported having *both* a heart condition and hypertension, mean spending for cardiovascular and renal drugs was 57% of total pharmaceutical spending. Pharmaceutical expenditures for persons with diabetes were concentrated in three drug classes: 34% of total drug spending was for cardiovascular and renal drugs, 21% for hormonal drugs, and 12% for pain relievers.

TABLE 2—Outpatient Pharmaceutical Expenditures, by Age and Chronic Disease Status, 1987

Age Group and Chronic Disease Status	% of Population	% of Pharmaceutical Expenditures	Mean per Capita Pharmaceutical Spending, $ (SE)	Drug Expenditures as % of Total Health Expenditures (SE)	For Those Spending in Upper Decile: % of Population	For Those Spending in Upper Decile: Mean per Capita Pharmaceutical Spending, $ (SE)	For Those Spending in Upper Decile: Drug Expenditures as % of Total Health Expenditures (SE)
Nonelderly adult (18–64 y)			104 (2.6)	13.0 (0.2)		687 (15.7)	40.3 (0.8)
None	66.3	29.9	47 (1.9)	9.4 (0.2)	21.1	601 (41.5)	40.4 (1.5)
One	20.5	25.6	129 (5.5)	16.3 (0.5)	28.0	612 (23.6)	41.1 (1.5)
Two	7.9	20.3	267 (14.4)	23.8 (0.8)	24.1	686 (34.2)	41.2 (1.5)
Three or more	5.3	24.2	478 (17.4)	29.0 (0.9)	26.8	834 (23.7)	38.6 (1.4)
Elderly (65+ y)			326 (7.8)	23.6 (0.4)		1316 (24.2)	39.5 (1.4)
None	15.8	4.4	91 (9.3)	11.1 (0.8)	2.6	*	*
One	23.8	14.3	196 (9.7)	22.2 (0.9)	8.9	*	*
Two	24.3	23.9	321 (11.4)	27.3 (0.8)	18.6	1227 (40.5)	45.5 (3.1)
Three or more	36.1	57.4	519 (15.3)	27.5 (0.6)	69.8	1323 (29.7)	37.6 (1.7)

Note. *Cell size is too small for reliable estimates. Chronic disease data were available for 91% of adult respondents. Thus, means presented in this table differ slightly from those presented in Table 1. Sampling weights were used to calculate statistics representative of the United States population in 1987. Pharmaceutical expenditures were corrected for underreporting and are in 1987 dollars.
Source. 1987 National Medical Expenditure Survey.

Discussion

Our findings highlight the importance of outpatient pharmaceutical expenditures for certain noninstitutionalized populations, including persons with chronic conditions and the elderly. For persons with chronic conditions, drug expenditures are often large and account for a significant portion of the person's total expenditures on health care. As growth in managed care enrollment continues, efficient management of drug use will become increasingly important. The elderly with chronic conditions are likely to bear a disproportionate share of the costs of proposed limits to Medicare risk plan payments. For plans that currently offer drug coverage, payment cuts may lead to benefit cuts, which in turn may reduce managed care enrollment and lead to higher out-of-pocket drug costs for the sickest.

The data presented above indicate that the potential for adverse selection of drug coverage among the elderly is significant. The elderly—especially those with chronic conditions—face strong incentives to purchase Medicare supplemental coverage with drug benefits, especially if any additional premium levied on the beneficiary is not sufficiently risk-adjusted. In fact, some evidence from the NMES supports the existence of adverse selection.[8,9] In contrast to those for the elderly, drug expenditures for children are relatively low. Thus, a drug coverage benefit as part of a publicly funded plan to improve insurance coverage for children, as has been recently proposed by the administration, need not have severe budget implications.

Finally, these data indicate how outpatient drug use is distributed nationally by therapeutic class. First, they indicate the importance of certain types of drugs in the patient's budget. Patients will be more responsive to increases in the price of drugs that consume a larger part of the individual's budget; information about such drugs could be used to selectively affect drug benefit design. For example, a Medicare health maintenance organization (HMO) might begin to selectively tighten drug benefits in response to lower capitation payments by imposing more cost sharing on drugs of those therapeutic classes that constitute smaller shares of the average patient's budget. Impacts on patient behavior might be even stronger where there are differences in price responsiveness based on the *nature* of the drug or therapeutic class. For example, expenditures on drugs for the treatment of hypertension are an important part of the elderly person's budget. When demand for these drugs is discretionary ("elastic"), as opposed to the inelastic demand for drugs for the treatment of acute illnesses (e.g., antibiotics), imposition of less cost sharing for hypertensives than for antibiotics may be a means of helping to ensure that use of hypertensives continues when use of drugs with inelastic demand increases. Additional research on differences in demand elasticities by therapeutic class may be warranted.

Second, data on drug use can be used to direct efforts towards improving physician prescribing patterns and patient compliance. Physicians prescribe potentially inappropriate medications for nearly a quarter of the noninstitutionalized elderly population,[10] and 16% to 30% of hospital admissions of elderly patients are drug-related.[11–14] The data presented above indicate that drug use is positively correlated both with the presence of heart disease and with the presence of more than one chronic disease. Such information can be used to target drug utilization review programs.

How expenditures vary by therapeutic class over time, of course, is subject to change. The data reported above describe the distribution of outpatient expenditures using classes that were defined for drugs that were available in the late 1980s. In fact, these distributions depend on health care technology and drug prices, as well as the epidemiology of disease. Technological advances in the development, production, and use of pharmaceuticals may affect the distribution of expenditures. Other technological developments

in health care may also affect the distribution of purchases, e.g., the shift in care from the inpatient to outpatient setting. Finally, changes in price and prescribing behavior may affect expenditure distributions, e.g., when a drug's price changes in response to a loss in patent protection or in response to a new product by a competitor. Thus, point estimates by therapeutic class may be somewhat different today than in 1987. Nevertheless, our findings suggest the utility of additional study of behavioral differences with respect to purchases of drugs in different classes. Results of these studies might be used to help structure insurance benefits to help maintain quality of care while controlling expenditures. □

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